# AMENDMENTS TO THE CLAIMS

1.  (Currently Amended) A method of determining the velocity (*v*) of a vehicle having at least one pair of a front and a rear wheel which are spaced by a wheel spacing (*B*), the method comprising for at least one pair of wheels:

    (a) determining front and rear wheel speed signals (~~w~~ω) indicative of the time dependent behavior of the front and rear wheel speeds, respectively;

    (b) correlating the front and rear wheel speed signals (~~w~~ω) based on a velocity-compensated correlation function (*R*) in which a velocity dependency is compensated with the wheel speed signal (~~w~~ω) of the front or the rear wheel such that a correlation feature remains unchanged with varying vehicle velocity (*v*) but changes with varying wheel radius (*r*) of the respective wheel, wherein the correlation feature is indicative of the wheel radius (*r*) of the respective front wheel or rear wheel, and further wherein the action of correlating is based on ~~a~~ the correlation function (*R*) of the front and rear wheel speed signals, said correlation function (*R*) is a function of a wheel radius~~time difference~~ (*r*), and the correlation feature is the specific wheel radius (*r̂*) ~~time difference~~ which corresponds to the maximum of said correlation function (*R*)~~, whereby the vehicle velocity (v) is computed from the specific time difference~~; and

    (c) determining the velocity (*v*) of the vehicle based on said ~~indicated~~ specific wheel radius (~~r~~r̂) and the wheel speed signal (~~w~~ω) of the respective front and rear wheel.

2.  (cancelled)

3.  (cancelled)

4.  (Currently Amended)  The method of claim 1, wherein said correlation function (*R*) is a function of the reciprocal (1/(~~w~~ω * *r*)) of the product (~~w~~ω * *r*) of the known wheel speed signal (~~w~~ω) and the respective unknown wheel

radius ($r$), and the correlation feature is the specific wheel radius ($f\hat{r}$) which corresponds to the maximum of the correlation function ($R$), whereby the vehicle velocity ($v$) is computed from the specific wheel radius ($r$-$f\hat{r}$) and the corresponding wheel speed signal ($w$-$\omega$).

5-7.    (cancelled)

8.    (Previously Presented)  The method of claim 1, wherein the radii of the front and the rear wheels are determined on the basis of the obtained vehicle velocity ($v$).

9.    (Currently Amended)  The method of claim 1, wherein the wheel speed signals ($w$-$\omega$) are provided by wheel speed sensors of an antilock braking system (ABS).

10.    (Previously Presented)  The method of claim 8, wherein the wheel radii thus determined are used for tire pressure determination.

11.    (Previously Presented)  The method of claim 1, wherein the velocity thus determined is used for road-friction monitoring.

12.    (Previously Presented)  The method of claim 1, wherein the velocity thus determined is used as input for control systems.

13.    (Currently Amended)  A system for determining the velocity ($v$) of a vehicle having at least one pair of a front and a rear wheel which are spaced by a wheel spacing ($B$), the system comprising:

(a)    wheel speed sensors arranged to provide front and rear wheel speed signals ($w$-$\omega$) indicative of the time dependent behavior of the front and rear wheel speeds, respectively;

(b)    a correlation unit arranged to correlate the front and rear wheel speed signals ($w$-$\omega$) based on a velocity-compensated <u>correlation function ($R$) in which a velocity dependency is compensated </u>with the wheel speed signal ($w$-$\omega$) of the front or the rear wheel such that a correlation feature remains unchanged with varying vehicle velocity ($v$) but changes with

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varying wheel radius ($r$) of the respective wheel, wherein the correlation feature is indicative of the wheel radius ($r$) of the respective front wheel or rear wheel, and further wherein the action of correlating is based on the correlation function ($R$) of the front and rear wheel speed signals, said correlation function ($R$) is a function of a wheel radius ($r$), and the correlation feature is the specific wheel radius ($\hat{r}$) which corresponds to the maximum of said correlation function ($R$) ~~and to determine the velocity (*v*) of the vehicle based on the indicated wheel radius (*r*) and the wheel speed signal ($\omega$) of the respective front or rear wheel, and further, wherein the action of correlating is based on a correlation function (R) of the front and rear wheel speed signals, said correlation function (R) is a function of a time difference (*r*), and the correlation feature is the specific time difference which corresponds to the maximum of said correlation function (R), whereby the vehicle velocity (v) is computed from the specific time difference.~~

(c)    a determination unit arranged to determine the velocity ($v$) of the vehicle based on said specific wheel radius ($\hat{r}$) and the wheel speed signal ($\omega$) of the respective front and rear wheel.

14.    (Currently Amended) A computer program product embodied on a tangible machine readable medium including program code for carrying out a method, when executed on a processing system, of determining the velocity ($v$) of a vehicle having at least one pair of a front and a rear wheel which are spaced by a wheel spacing ($B$), the program code being arranged to:

(a)    determine front and rear wheel speed signals (~~w~~$\omega$) indicative of the time dependent behavior of the front and rear wheel speeds, respectively;

(b)    correlate the front and rear wheel speed signals (~~w~~$\omega$) based on a velocity-compensated correlation function ($R$) in which a velocity dependency is compensated with the wheel speed signal (~~w~~$\omega$) of the front or the rear wheel such that a correlation feature remains

unchanged with varying vehicle velocity ($v$) but changes with varying wheel radius ($r$) of the respective wheel, wherein the correlation feature is indicative of the wheel radius ($r$) of the respective front wheel or rear wheel and further, wherein the action of correlating is based on ~~a~~ the correlation function ($R$) of the front and rear wheel speed signals, said correlation function ($R$) is a function of a wheel radius ($r$) and the correlation feature is the specific wheel radius ($\hat{r}$)~~time difference~~ which corresponds to the maximum of said correlation function ($R$)~~, whereby the vehicle velocity ($v$) is computed from the specific time difference~~; and

(c)     determine the velocity ($v$) of the vehicle based on said ~~indicated~~ specific wheel radius ($\textbf{r}\hat{r}$) and the wheel speed signal ($\textbf{w}\underline{\omega}$) of the respective front or rear wheel.

15.     (Currently Amended) The method of claim 9, wherein the wheel radii <u>for the front and rear wheels in the at least one pair of wheels</u> thus determined are used for tire pressure determination.

16.     (Currently Amended) A system for determining the velocity ($v$) of a vehicle having at least one pair of a front and a rear wheel which are spaced by a wheel spacing ($B$) the system comprising:

(a)     wheel speed sensors arranged to provide front and rear wheel speed signals ($\textbf{w}\underline{\omega}$) indicative of the time dependent behavior of the front and rear wheel speeds, respectively;

(b)     a correlation unit arranged to correlate the front and rear wheel speed signals ($\textbf{w}\underline{\omega}$) in order to determine a specific correlation feature indicative of the time delay ($\tau$) between the front wheel and rear wheel speed signals, wherein the correlation feature is obtained by Fourier transforming the wheel speed signals ($\textbf{w}\underline{\omega}$) to obtain Fourier transformed wheel speed signals ($\Omega$) and calculating a phase function (arg ($\Omega_1(f)/\ \Omega_3(f)$)) of the ratio of the Fourier transformed wheel speed signals ($\Omega$) of the front and the rear wheel, wherein the slope of said phase function is the correlation feature indicative of the time delay ($\tau$)

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and arranged to determine the velocity ($v$) of the vehicle based on the indicated ~~wheel radius ($r$)~~ <u>time delay ($\tau$)</u> and the wheel speed signal (~~$w$~~<u>$\omega$</u>) of the respective front or rear wheel~~, and wherein the action of correlating is based on a correlation function ($R$) of the front and rear wheel speed signals, said correlation function ($R$) is a function of a time difference ($r$), and the correlation feature is the specific time difference which corresponds to the maximum of said correlation function ($R$), whereby the vehicle velocity ($v$) is computed from the specific time difference~~.

17. (Currently Amended) A computer program product <u>on a tangible machine readable medium</u> including program code for carrying out a method, when executed on a processing system, of determining the velocity ($v$) of a vehicle having at least one pair of a front and a rear wheel which are spaced by a wheel spacing ($B$), the program code being arranged to:

(a) determine front and rear wheel speed signals (~~$w$~~<u>$\omega$</u>) indicative of the time dependent behavior of the front and rear wheel speeds, respectively;

(b) correlate the front and rear wheel speed signals (~~$w$~~<u>$\omega$</u>) in order to determine a specific correlation feature indicative of the time delay ($\tau$) between the front wheel and rear wheel speed signals, wherein the action of correlating is based on a correlation function ($R$) of the front and rear wheel speed signals, ~~said correlation function ($R$) is a function of a time difference ($r$), and the correlation feature is the specific time difference which corresponds to the maximum of said correlation function ($R$), whereby the vehicle velocity ($v$) is computed from the specific time difference~~, and further wherein the correlation feature is obtained by

aa) Fourier transforming the wheel speed signals (~~$w$~~<u>$\omega$</u>) to obtain Fourier transformed wheel speed signals ($\Omega$);

bb) calculating a phase function (arg ($\Omega_1(f)/ \Omega_3(f)$)) of the ratio of the Fourier transformed wheel speed signals ($\Omega$) of the front

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and the rear wheel, wherein the slope of said phase function is the correlation feature indicative of the time delay ($\tau$); and

 (c) determine the velocity ($v$) of the vehicle based on the indicated time delay ($\tau$) and the wheel spacing ($B$).

18. (Currently Amended)  The method of claim 1, wherein the correlation function (R) reads

$$R_{13}(x) = E[(w\underline{\omega}_1(t)))(-w\underline{\omega}_3(t-x/-w\underline{\omega}_1(t))) - E(w\underline{\omega}_3(t-x/-w\underline{\omega}_1(t))))]$$
$$\text{with } x = B/r_1.$$

and whereby

$B$ is the spacing between the axles of the front and the rear wheel,

$w\underline{\omega}_1(t)$ is the velocity of the front-left wheel,

$w\underline{\omega}_3(t)$ is the velocity of the rear-left wheel,

$r_1$ is the radius of the front-left wheel, and

E denotes the expectation value.

19. (Currently Amended)  The method of claim 1, wherein an estimation value ($r_1$) for the wheel radius of the front-left wheel is obtained from the equation $r_1 = arg\ maxR_{13}(B/r)$ and wherein the vehicle velocity at this wheel is obtained based on this wheel radius estimation value ($r_1$) and the corresponding wheel speed $(w\underline{\omega}_1(t))$.

20. (Currently Amended)  A method of determining the velocity ($v$) of a vehicle having at least one pair of front and a~~~~ rear wheels which are spaced by a wheel spacing ($B$), the method comprising for at ~~lease~~ least one pair of wheels:

 (a) determining front and rear wheel speed signals ($w\underline{\omega}$) indicative of the time dependent behavior of the front and rear wheel speeds, respectively;

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(b)     correlating the front and rear wheel speed signals (~~w~~ $\underline{\omega}$) in order to determine a specific correlation feature indicative of the time delay ($\tau$) between the front wheel and rear wheel <u>speed</u> signals, wherein the action of correlating is based on a correlation function ($R$) of the front and rear wheel speed signals, ~~said correlation function (R) is a function of a time difference (r), and the correlation feature is the specific time difference which corresponds to the maximum of said correlation function (R), whereby the vehicle velocity (v) is computed from the specific time difference,~~ and further, wherein the correlation feature is obtained by

aa)     Fourier transforming the wheel speed signals (~~w~~ $\underline{\omega}$) to obtain Fourier transformed wheel speed signals ($\Omega$);

bb)     calculating a phase function (arg ($\Omega_1$ ($f$)/ $\Omega_3$ ($f$))) of the ratio of the Fourier transformed wheel speed signals ($\Omega$) of the front and the rear wheel, wherein the slope of said phase function is the correlation feature indicative of the time delay ~~(r)~~ $\underline{(\tau)}$;

(c)     determining the velocity ($v$) of the vehicle based on the indicated time delay ($\tau$) and the wheel spacing ($B$).

21.     (New)  The method of claim 20, wherein the front and rear wheel speed signals ($\omega$) are transformed from angle domain to time domain by interpolation without aliasing effects.

22.     (New)  The method of claim 20, wherein the action of correlating is based on the reciprocals of the wheel speed signals ($1/\omega$) to perform the action of correlating within the angle domain.

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